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OF

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THE CLINICAL HISTORY AND EXACT LOCALIZATION OF PERINEPHRIC ABSCESSES.

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PURULENT collections in the cellular and adipose tissue surrounding the kidney are very properly termed perinephric, or circumrenal, abscesses. It has recently become somewhat customary to speak of them as perinephritic abscesses. I believe that perinephric is etymologically the more correct adjective. We speak with propriety of hepatic, pneumonic, and prostatic abscesses, instead of hepatic, pneumonitic, and prostatitic abscesses. Hence perinephric, perimetric, and perityphlic are preferable to the longer forms, which, moreover, in most instances are evidently derived from the corresponding term designating inflammation, while general analogy requires the nomenclature to have an anatomical rather than an etiological derivation.

Perinephric abscess is more common than is usually supposed, and its presumed rarity causes its existence to be often unsuspected.

Causes.—Inflammation and suppuration may occur in the tissue surrounding the kidney from contusions and other wounds, strains from muscular activity, exposure to cold, and various depressing blood conditions, such as septicæmia and typhoid fever. Again, perinephritis and perinephric abscess may arise secondarily from disease of the kidney. Inflammation of the renal pelvis, of the kidney structure, or of both, especially when suppurative or when due to calculi, cystic disease, or cancer, can easily induce inflammation of the surrounding cellular tissue. Abscess will almost certainly occur, if urine, pus, a fragment of calculus, or parasites escape from the kidney or its appendages into the meshes of its fatty envelope. In a similar way secondary perinephric inflammation

¹ Read before the Philada. Academy of Surgery, March 5, 1883.

may be caused by perforation of the colon, by typhlitis, perityphlitis, hepatic abscess, rupture of the gall-bladder, perforation of the diaphragm in cases of empyema or pulmonic abscess, by spinal caries, psoas abscess, peritonitis, pleuritis, and indeed by inflammation of any adjacent organ.

Operations upon the testis and cord and pelvic viscera, such as castration, excision of the rectum, and lithotomy, and puerperal inflammations may induce perinephric abscess on account of the continuity of the cellular tissue in the pelvis with that in the kidney region. Inflammatory affections of the genito-urinary organs are factors in the production of perinephric abscess of primary importance. These organs are embryologically and anatomically connected with the kidney through the bladder and ureter; hence the extension of the inflammation to the kidney and thence to the perinephric tissue is easily understood. Cases are even recorded as due to permanent catheters.¹ Another mode of transference is by the continuity of the retroperitoneal connective tissue. This may allow the morbid process to extend by continuity of structure from the membranous urethra, prostate gland, bladder, and seminal vesicles to the tissue around the kidney without involving the kidney or other structures to any noticeable extent.

The agency of the veins and nerves in establishing a pathological union between the pelvic organs and the renal region is doubtless very effective. Embolic and septic processes and neuropathic influences become very possible and intelligible when we think of the direct blood and nerve routes between the pelvic and lumbar regions. For example, what could be more direct than the connection of the testes and scrotum with the renal region by means of the spermatic vein and ilio-inguinal nerve. Many similar though less obvious anatomical bonds can be comprehended.

Symptoms.—The constitutional symptoms of pus in the perinephric tissue are liable to the variations seen in other suppurative inflammations. Rigors, febrile movement, sweating, anorexia, vomiting, constipation, and perhaps delirium are marked in acute cases, while in chronic cases there may be so few constitutional symptoms that the existence of internal suppuration is overlooked. Constipation is sometimes very obstinate and apparently due to pressure on the colon. On the left side especially the colon can readily be compressed by swelling of the tissues in front of the kidney. When perinephric abscess follows puerperal perimetritis and similar conditions, the violence of the symptoms and a rapid death may interfere with recognition of the secondary trouble near the kidney.

The fever is sometimes continuous, and resembles typhoid fever; at other times its intermittent character suggests malarial influences. In perinephric abscess which has been allowed to burrow, septicaemic symptoms become prominent.

¹ Nieden, Deutsches Archiv für klinische Medicine, 1878. Bd. xxii. Fälle 92 and 93.

The pain in its onset is often sudden. It is usually referred to the loin and side, is increased by pressure, and may shoot down the thigh, or into the genital region. Pain in the scrotum and penis at times occurs as a quite prominent symptom. Retraction of the testicle towards the inguinal canal may take place. It is stated that this does not occur, even when pain is experienced in the organ, unless there is, in addition to the perinephritis,¹ disease of the kidney, such as calculous nephritis. If this is true, it is a valuable diagnostic point in the differentiation of secondary from primitive perinephric abscesses. I doubt the accuracy of the statement. Nieden in his table records only sixteen cases in which pain was noted in the abdomen, groin, thigh, and genitals. Gibney has seen cases in which pain was felt in the knee as in coxalgia.² The lumbar and other pains may remit, disappear entirely for several days, or be altogether absent. The pain of perinephritis causes the patient to immobilize the spine, and assume, according to Gibney,³ a stooping posture with the shoulders elevated.

Spasmodic action of the psoas muscle often induces, in the course of a week or ten days, flexion of the thigh upon the pelvis. The pain may be relieved by this posture. It is not uncommon in subacute cases for the patient, in order to relax the psoas, to walk with the body bent forward, and with the hand of the affected side resting upon the middle of the thigh. To relax the parts, the trunk is sometimes bent laterally, so that the ribs approach the iliac crest.

The position of the thigh is a symptom of great value, and may be attributed to coxalgia or rheumatism instead of to perinephritis. I believe flexion of the thigh to be an accompaniment especially of perinephric abscesses at the lower third of the kidney. It is recorded as observed in 27 out of 166 cases tabulated by Nieden. The flexion may be merely sufficient to prevent extreme passive extension of the hip, or so great as to draw the thigh firmly up against the abdomen. When thus bent, pain may be absent, but the slightest attempt at extension causes complaint. The hip may therefore be continuously flexed. Hence the patient may scarcely be able to turn over in bed to allow examination of the loin. All motions of the hip except extension may be perfect and painless. Difficulty in voluntary adduction of thigh has been mentioned by Gibney⁴ in a case in which the thigh was semiflexed, and rotated outward. In another case he found towards the end of the affection slight resistance to complete passive flexion of the thigh on the abdomen. These symptoms pointed strongly to possible coxitis; but the subsequent history did not cause Dr.

¹ Nieden, Deutsches Archiv für klinische Medicine, 1878. Bd. xxii. S. 498.

² Amer. Journ. Medical Sciences, 1877, vol. i. p. 399; Id., 1878, vol. ii. p. 403; and elsewhere.

³ Chicago Medical Journal and Examiner, June, 1880.

⁴ Amer. Journ. Med. Sciences, 1877, vol. i. p. 395 and p. 401.

Gibney to change his diagnosis of perinephritis cured by resolution. The same author has described¹ a case where adduction in addition to flexion existed. Cure followed incision giving escape to about a pint of pus.

These abnormal positions and interferences with function of the thigh lead in subacute cases to a gait that is remarkably suggestive of the second stage of coxalgia. When pain in the knee coexists, the acutest observer must be guarded in diagnosis and prognosis. I have found one case reported² in which convulsive movements of the leg occurred as a symptom of perinephric abscess consecutive to cancer of the kidney; and another³ in which the large tumour caused oedema of the lower extremity.

Involvement of the lumbar plexus by pressure of the inflammatory products may give rise to general or localized anaesthesia, or temporary motor paralysis of the thigh. These symptoms occurred in eight of the cases contained in Nieden's table. The same writer records a case⁴ in which there was paresis of both legs; and another⁵ in which a left side abscess was accompanied by left pleuritis and paresis of both legs and the right arm. The latter case went on to suppuration; in the former resolution occurred. Neuralgic troubles may be induced by similar pressure and interference with the nerve branches.

It is generally said that the urine presents only those changes incidental to the febrile condition, unless the perinephritis be secondary to calculous nephritis, vesical inflammation, or similar causes. Then it may contain blood, pus, albumen, and tube-casts. My experience shows that a large amount of albumen may be present, probably from venous obstruction, when no kidney lesion of moment exists. It is remarkable that in Nieden's table there is not a single case mentioned in which albuminuria without purulent urine was noted. This may be owing to careless observation by the original reporters. Haematuria is not very unusual at the beginning of traumatic perinephritis.

Incontinence of urine and frequent or painful micturition have been observed. These symptoms are probably due to the abundant urates or to other chemical changes in the urine occurring with the febrile condition, or to the disturbance of the innervation of the pelvic organs.

Distressing flatulence and irregular constipation have been noticed by Moxon,⁶ who ascribes these symptoms to inflammatory thickening involving the nervous structures around the vena cava and aorta, and thus causing paralysis of the abdominal sympathetic. This is, he thinks, more likely to occur in left-side perinephritis, than in cases of disease on the right side, such as he describes in his remarks.

Dulness on percussion of the space between the ribs and the crest of the

¹ Chicago Med. Journ. and Examiner, June, 1880, Case XXVI.

² Nieden, Case 105.

³ Nieden, Case 149.

⁴ No. 151.

⁵ No. 150.

⁶ Lancet, May 1, 1875, p. 603.

ilium is usually found ; and pressure made by the hands, placed one in front and one behind, will sometimes discover a tumour, or elicit a feeling of elastic resistance or indistinct fluctuation. The tumour thus perceptible is rounded, with smooth edges, and moves little, if at all, with the respiratory act. The girth of the lumbar region becomes from swelling unsymmetrical, and the affected side measures one to two inches more than the opposite region. This is best appreciated by measurement with the tape, for the swelling may be general and not localized. There may also be broadening of the buttock, effacement of the normal hollow in the loin, increased girth of the upper portion of the thigh, effacement of the dimple over the trochanter, and spinal deviation towards the diseased side. The tumour discovered by palpation must be distinguished on the left side from feces in the descending and sigmoid portions of the colon ; and on the right from liver tumour. Evacuation of the contents of the great intestine by laxatives and enemas, and the normal situation of the colon percussion-tympany, will remove one source of doubt ; and the motion of the liver during respiratory acts will get rid of the other.

The tumefaction is accompanied by a subjective tenderness and sense of tension, which will probably be increased as suppuration occurs in the inflamed tissue. It may also cause dyspnoea from pressure upwards against the diaphragm.

Finally, in those cases of perinephritis which do not result in resolution, fluctuation becomes evident. This is preceded, perhaps, by rigors, local œdema, redness, and exquisite pain on pressure over the advancing pus. When the abscess is opened, either spontaneously or by operation, the febrile temperature falls, the digestive organs perform their functions properly, and the patient is relieved of pain. Cure soon follows, unless complications or extensive burrowing of pus have occurred. In chronic perinephric abscess the symptoms may be very obscure.

The clinical characteristics of perinephric abscess and its proper treatment will be illustrated by the following history :—

CASE I. Perinephric Abscess, subsequent to Internal Urethrotomy, treated by Incision; Rapid Recovery.—A gentleman who had suffered during a number of years with an irritable stricture of large calibre, was subjected, in February, 1882, to internal urethrotomy. After the operation, which was done by a distinguished professor of surgery, a large bougie was passed (36 French). Subsequently he had in the course of a few days three chills; but was soon able, though weak, to go out of the house. The urethra was systematically dilated with large instruments during this period. Two or three weeks after the division of the stricture he consulted me, because of intense pain in the right lumbar region and right testicle, for which he had kept his bed during several days. There was great pain on motion, which sometimes persisted even when the man kept still ; but nothing abnormal, except tenderness on pressure, could be detected in the loin. I looked upon the case as one of myalgia, or of

nephralgia; and prescribed quinia, morphia, and belladonna, and applied a blister over the painful area.

Considerable amelioration of pain occurred in a few days, and I thought he was getting well; but this was a very temporary improvement. I then examined the urine, which contained no pus, by the liquor potassae test, and showed no bloody discoloration. It contained, however, a large amount of albumen. The pain continued in varying intensity, and was accompanied with great tenderness on both sides of the spine and over the sacrum. He complained of anomalous feelings in the right lower extremity, which was described as being like a "limb asleep" rather than painful. Motion, however, was good, though performed slowly and with care. No heart or lung lesion was discovered by physical exploration. There was no apparent fever, no chills, no special digestive disorder; and the urine was voided freely and in a large stream. No history of gravel having ever been passed could be obtained. A few days later I thought I detected a slight fulness near the lumbar spines, in the region of the kidney, but no fluctuation could be distinctly obtained. At this time the urine showed a slight trace of albumen, had specific gravity of 1012, and contained no sugar. I considered the pain which existed to be occasioned by pressure on the lumbar plexus by some kidney affection, probably due to the chronic stricture. The pain in the scrotum was less than formerly, but the paresis of sensation in the thigh remained.

On March 24th the swelling in the loin was more marked, and the local tenderness great. A large bougie could readily be passed through the urethra. The introduction of a sound failed to discover any calculi or calculous material in the bladder. The morning and evening temperature was reported by the nurse as below 100°; there were no chills, and the pulse was 80 to 90. Dr. John Ashhurst, at my request, saw the patient with me in consultation, and thought there was œdema over the swollen surface. We made the diagnosis of abscess in the cellular tissue around the kidney, which Dr. Ashhurst thought to be still below the muscular masses of the back. Poultices and the application of tincture of iodine were resorted to as the local treatment.

Six days later I thought it would be proper to evacuate the pus, as fluctuation seemed more distinct. At this time the pain had become less severe, and there was no longer any albuminuria. Asking Dr. Ashhurst to see the case a second time, I found that he concurred in the belief that operation was advisable. I accordingly made a vertical incision, one and a quarter inches long, through the skin and lumbar fascia. Introducing my forefinger, I bored down through the softened muscles, between two lumbar transverse processes, until at nearly the full length of my finger I evacuated two or three fluidrachms of pus; a drainage tube was introduced, and the wound poulticed. Carbolized injections through the tube were subsequently used every day.

On the third day after this procedure, a note was made to the effect that there was little or no pain on pressure in the lumbar region, and that the pain and numbness in the right buttock and extremity had disappeared since the operation. The convalescence was rapid and uninterrupted. On the tenth day he was sitting up and walking about his room a little. About this time he began cautiously using a large bougie again. The last note, made about one month later, says he is strong and well, and walks a good deal. He still had a slightly tender spot over the sacrum near the middle line, and the stricture was irritable after smoking.

I have purposely omitted the details of treatment, because they are not important in studying the clinical history. The symptoms are, however, in my opinion, of great interest, because they localize so distinctly the position of the small abscess. The pain felt early in the disease in the scrotum and testicle, and the paresis of sensation, which soon affected the buttock and the front and outside of the thigh, show that the pressure was exerted upon the ilio-hypogastric, ilio-inguinal, genito-crural, and external cutaneous nerves. These nerves are branches of the first and second lumbar nerves, which also supply branches to the back. Hence it is evident that the abscess was situated at the level of the first and second lumbar vertebrae. This inference is rendered more conclusive by the existence of albuminuria, which was due to pressure on the renal vein causing congestion of the kidneys. This vein is known to be situated¹ on a level with the first lumbar vertebral body.

As the abscess approached the surface of the back, pain in the scrotum diminished, and albumen disappeared from the urine, because pressure was decreased. There was no tonic spasm of the psoas, iliacus, or pectenius muscles, causing flexion of the hip, as in the case which I shall presently describe, because the abscess was too high up to press upon the third and fourth lumbar nerves, whose branches supply the muscles mentioned. It is probable that if the incision had not been made, the abscess by burrowing downwards would finally have given rise to flexion of the thigh upon the pelvis. I do not feel sure of this, because the position of the abscess behind the kidney might have led to spontaneous evacuation through the muscles of the back before the quantity of pus had become sufficient to involve the structures opposite and below the inferior end of the kidney.²

These points in surgical anatomy I deem important, because I have not seen them mentioned in connection with perinephritis. They will serve as good guides in the determination of the position of the incision, when the surgeon feels called upon to explore a suspected perinephric abscess.

Cases are reported where incision or puncture failed to find pus in instances whose subsequent history confirmed the diagnosis of abscess. A more careful study of symptoms may hereafter enable us to localize the pus more exactly.

Untreated perinephric abscess, if life is prolonged, usually opens in the lumbar region; but the pus may be discharged into the colon, stomach, small intestine, pleural cavity, bronchial tubes, pericardium, or peritoneal

¹ See Braune's Topographical Anatomy, Bellamy's translation, p. 129.

² In January and February of this year (1883), after the above paragraphs had been written, this patient was treated by me for a chronic perinephric abscess, situated three or four inches below the cicatrix of the first. There was no albuminuria and no scrotal pain; but flexion of the hip was marked. The abscess was evidently connected with the old seat of disease, for pus was subsequently evacuated also from the vicinity of the first incision.

cavity ; or the abscess may open upon the surface in the hypochondrium, below Poupart's ligament, upon the buttock through the sciatic notch, or by perforating the ilium, or discharge into the pelvis of the kidney, the bladder, vagina, or urethra. The pus may find its way into the sub-iliac bursa, and, by the communication that often exists between this sac and the hip-joint, even enter the joint itself. It may burrow into the scrotum. The pus may amount to three or four pints, and may, especially in consecutive abscesses, be thin, ichorous, and mixed with urine. It may be offensive and fecal in odour, even when there is reason to believe that no intestinal fistule communicates with the pus cavity. In primitive perinephric abscess the pus is thick and odourless, and perhaps contains shreds of connective tissue. Troussseau has observed¹ emphysema under the integument of the back from an opening between the gut and the abscess. The large amounts of pus only occur when delay in operating has allowed extensive suppuration. Bowditch² believes in the frequent occurrence of thoracic complications from contiguity with perinephric abscesses. He describes two cases, in which he was consulted for lung disease, that were found to be perinephric abscesses opening through the lung.

The following case illustrates the course of the disease when not treated by prompt surgical measures :—

CASE II. Probable Perinephric Abscess following Gonorrhœa; Condition not suspected; Death with Septicæmic Symptoms.—This history, which dates back a number of years, is a humiliating one, for, though the patient was seen by myself and several other medical men, the possible existence of perinephric abscess was not suggested until death had occurred. When subsequently thinking over the circumstances, I became convinced that the purulent collection, for which we had searched in vain in the pelvic and anterior abdominal regions, should have been looked for in the lumbar region. Though proof was then unattainable, I believed, and still believe, the posthumous diagnosis probably correct.

The patient, on account of gonorrhœa, had retention of urine, which required catheterization. Subsequently orchitis with scrotal abscess occurred, and about the same time, or perhaps a little previously, a small abscess on the outer aspect of the left thigh appeared. Both these collections of pus were evacuated by incision. During the maturation and cure of these abscesses, the right hip became somewhat flexed. When I saw him after an absence of some weeks, I found the thigh firmly flexed, and the patient weak, nervous, and hysterical, afraid of any examination, and continually desiring morphia or ether. He could not move his thigh because of pain, nor would he allow it to be extended. It was thought probable that the position of the right limb was originally due to the patient having assumed this posture to keep the scrotum and left thigh free from pressure of the bed-clothes, and that the voluntary disuse of the joint during a series of weeks had induced in his irritable and nervous condition a hysterical contraction. Ether was administered; and the hip forcibly

¹ Clinical Medicine.

² Medical and Surgical Reports of Boston City Hospital for 1870.

extended with a cracking noise, similar to that heard in breaking up arthritic adhesions.

After regaining consciousness, the man could move the limb to a limited extent without marked pain. Permanent extension was made by attaching a weight to the foot. Five or six days later the weight was removed because of pain. The flexion then recurred. The etherization was done about two months after the time of contracting the original gonorrhœal trouble. Owing to unavoidable circumstances, I only saw the patient occasionally and at long intervals. The daily treatment was carried out by my medical friends, and occasionally either I or another surgeon saw him.

My notes, dated about six weeks after the day of etherization, show that the general condition had steadily become worse, notwithstanding the exhibition of quinia, iron, and milk punch. Hebetude, delirium, dry tongue, chilliness, sweating, emaciation, and great prostration made us believe that septicæmic processes were present. There was no marked pain except on attempting to move the right hip-joint; but some abdominal tenderness apparently existed. The urine was freely passed, no pulmonary change was found on auscultation, and neither palpation of the abdomen nor digital exploration of the rectum revealed the purulent accumulation sought for in the abdomen or pelvis. I have no note or recollection of the patient experiencing pain in the lumbar region; nor of the loin being examined with special reference to the possibility of the abscess being as high as the kidney.

Four months and a few days after contracting gonorrhœa, the patient died. After death, an attendant, in the words of my note book, "found gurgling at upper part of right thigh, as if a decomposing abscess had worked down from within pelvis or abdomen."

I now feel that the flexion of the thigh was probably due from the first to perinephritis, causing little or no lumbar pain, but which finally gave rise to an abscess in the cellular tissue around the kidney. This abscess increased and slowly burrowed behind the peritoneum and along the psoas muscle until it reached the groin. Here it would probably have evacuated itself spontaneously, if life had been prolonged.* It is impossible now to determine whether examination of the loin would have led to its discovery, or operative treatment have been followed by convalescence.

Complications.—Numerous complications may arise if perinephric abscesses are allowed to increase indefinitely until spontaneous evacuation occurs. I have already spoken of the directions in which this may take place. The complications, such as peritonitis, which may accompany such events, need not be discussed. The kidney, according to Ebstein,¹ becomes involved secondarily from disturbance of its nutrition produced by the inflammation located in the perinephric structures. Cloudy swelling of the epithelial cells, necrosis or abscess of the kidney structures, and diminution and induration from pressure are mentioned by him. These effects can easily be understood on considering the clinical history of the case first reported, where there was abundant albumen in the urine due undoubtedly to pressure upon the renal vein.

¹ Ziemssen's Cyclopædia of Medicine, vol. xv. p. 592. New York, 1877.

The danger of thoracic involvement is insisted upon by Bowditch. In nine cases of perinephric abscess, auscultatory signs of pulmonary implication were discovered by him in seven. Although some of these presented no marked chest symptoms, he regarded these physical signs an important argument for operation in the loin, because they showed that the inflammation was travelling upward and beyond the original site.

Diagnosis.—In the very early stages of perinephric abscess the diagnosis is often impracticable. Especially is this so when the symptoms are not very pronounced, and when there have been no previous renal symptoms to direct attention to the vicinity of the kidney. The symptoms already described make the diagnosis easy, as a rule, when the inflammatory process has advanced beyond the initial stage. Lumbago simulates the pain of perinephric abscess, but it is unaccompanied by fever, and causes the patient to walk with a rigidity of spine that is different from the lameness due to the partially flexed hip of perinephritis. I must admit, however, that there may be little or no fever in the latter disease, and that the pain may cause a mere stiffness of the spine without any spasm of the psoas being present. Moreover, the impairment of the hip motions may in some cases of perinephritis occur late, or may, indeed, be altogether absent.

Aching kidney¹ and nephralgia, or neuralgia of the kidney, are terms indefinitely descriptive of pain in the renal region from unknown pathological causes. Aching kidney gives, according to Duncan, a heavy wearing pain, felt especially in the hypochondrium and frequently associated with pain down the limb and with irritability of the bladder. He believes that there exists swelling of the kidney or perinephric tissue, or both, which can be felt by palpation. The location of the pain in the anterior region, the fact, at least in women, that it is increased during menstruation, and the non-sequence of more pronounced symptoms are *supposed* to distinguish this condition from true perinephritis. Nephralgia may be recognized by the paroxysmal character of the pain and the known neuralgic diathesis of the individual, especially if the absence of injury or of genito-urinary irritation is conspicuous.

Organic affections of the kidney may of course be the cause of perinephric abscess by secondary involvement of the cellular tissue around the organ. The diagnosis of renal lesions, without perinephric abscess, is made by the symptoms peculiar to each. Cancer of the kidney is usually accompanied by hematuria, rapid decline in health, and perhaps later by the physical signs of a distinct growth and the involvement of surrounding viscera. The tumour may be nodular.

Renal cysts are not accompanied by local increase of surface temperature, nor by oedema in the lumbar region. These symptoms are distin-

¹ J. Mathews Duncan, Medical Times and Gazette, Nov. 16, 1878, p. 563.

tive of perinephric abscess. Calculous nephritis is usually preceded, or accompanied, by attacks of intense pain and perhaps vomiting due to small calculi passing down the ureter. The sudden relief of pain when the stone enters the bladder is almost pathognomonic. The existence of pus, blood, and gravel in the urine, when not traceable to bladder disease, always points to lesions of the kidney itself. Such occurrences are not part of the clinical history of perinephric abscess, unless it is secondary to inflammation of the renal pelvis (*pyelitis*), or to *pylo-nephritis*.

When percussion or pressure over one of the spinous processes of the vertebral column gives rise to pain, when there seems to be slight angular projection backwards, when straightening or extending the spine by suspending the patient from the armpits relieves pain, and when there is bilateral interference with the innervation of the legs, it is probable that vertebral caries exists. The similarity of some cases of perinephritis to this condition will be evident when I say that the spinal brace has been ordered¹ for a patient suffering with a perinephritis which finally required incision to evacuate pus.

Perityphlic abscess is not likely to be confounded with perinephric abscess, for the tumour-like mass of indurated cellular tissue in the latter case is higher and not so easily felt by palpation of the front of the abdomen, and there is a more marked tendency for flexion of the hip to occur. Perityphlic abscess, on the other hand, is more likely to present forwards, to cause oedema of the corresponding limb from pressure on the iliac vein, and when opened to furnish fetid or stercoreaceous pus and gas. The numbness of the thigh and the hip-flexion found at times in perinephric abscesses may also be found in perityphlitis.

Masses of feces, and splenic or hepatic tumours may in rare instances simulate the indurated swelling due to perinephritis. The first can be removed by laxatives; the last two conditions are distinguished from perinephritis by the ease with which they are displaced downwards during inspiration.

Perinephric tumours are retroperitoneal, and therefore on the right side the ascending colon lies to the inner side of such a tumour, while on the left side the descending colon has a position in front of it.²

If the abscess around the kidney perforates the diaphragm, and discharges pus into the pleural sac or bronchial tubes, empyema or abscess of the lung may occur. These conditions may be recognized without the existence of perinephric abscess being suspected.³

Flexion of the thigh, if present, and the other symptoms of perinephritis, would attract the attention of the careful and intelligent observer,

¹ See Dr. Gibney's paper in Chicago Medical Journal and Examiner, June, 1880.

² Nieden in Deutsch. Archiv für klin. Med., Nov. 1878, S. 500, quotes Wells and Simon.

³ Bowditch, Medical and Surgical Reports of Boston City Hospital, 1870, p. 58.

as they did that of Dr. Bowditch. Cure may occur in such instances after the expectoration of 18 ounces of pus.¹

Dr. F. Lange has recently reported a case, from Thiersch's clinic in Leipzig, where there existed empyema and a sinus on the front of the thigh, both apparently secondary to a perinephric abscess.²

I have purposely postponed the consideration of the differential diagnosis of perinephritis and coxitis, and of perinephritis and inflammation of the psoas muscle until this time, because of the importance and difficulty of the topics.

In perinephritis there is often flexion and painful rigidity of the hip-joint, with perhaps *ad-* or *ab-*duction of the thigh and pain at the knee. These symptoms at once suggest hip-joint disease. Usually in such cases, however, passive flexion of the hip can be made without causing pain, and may even relieve existing pain. Attempted extension of the thigh is, on the contrary, at once painful. This aids in diagnostinating the condition from coxitis, where all motions are apt to be painful. There will probably be found less rigidity of the adductors in perinephritis than in coxitis.

In coxitis there is often fulness and tenderness on pressure over the trochanter or joint, pain on percussion of the femur, and subsequent shortening and atrophy of the thigh. There is, however, no fulness in the lumbar region, which is a frequent feature of perinephric abscess. The semicircumference of the trunk on the affected side will, in the latter disease, often be increased one to one and a quarter inches. Atrophy of the thigh occurs also in perinephritis if the limb is flexed and not used for a long time; hence great caution is at times required to avoid committing an error in diagnosis. Gibney believes that many reported cures of hip disease, with perfect return of function, are, in truth, instances of perinephritis cured by resolution, which have been mistaken for coxitis.

Inflammation of the psoas muscle and psoas abscess present some of the characteristics of perinephric abscess. Usually, however, there are associated with psoas abscess symptoms of caries of the vertebra, such as a painful spinous process, when pressure is made along the spinal column posteriorly. In psoas troubles there is apt to be more tenderness and pain in front than in perinephritis. The impaired motion of the hip-joint and the interference with the innervation of the thigh are similar to what is found in perinephric abscesses involving the psoas muscle secondarily. There is, however, neither pain nor fulness in the loin.

The diagnosis between coxitis or psoitis and perinephritis must in obscure cases rest upon the combination of symptoms and the progress from day to day. A careful study of the section of this article devoted to the symptomatology of perinephritis will render a diagnosis usually practi-

¹ Neiden, Case 98.

² New York Med. Journ., January 27, 1883.

cable within a short time. In the early stages an absolute diagnosis may be impossible.

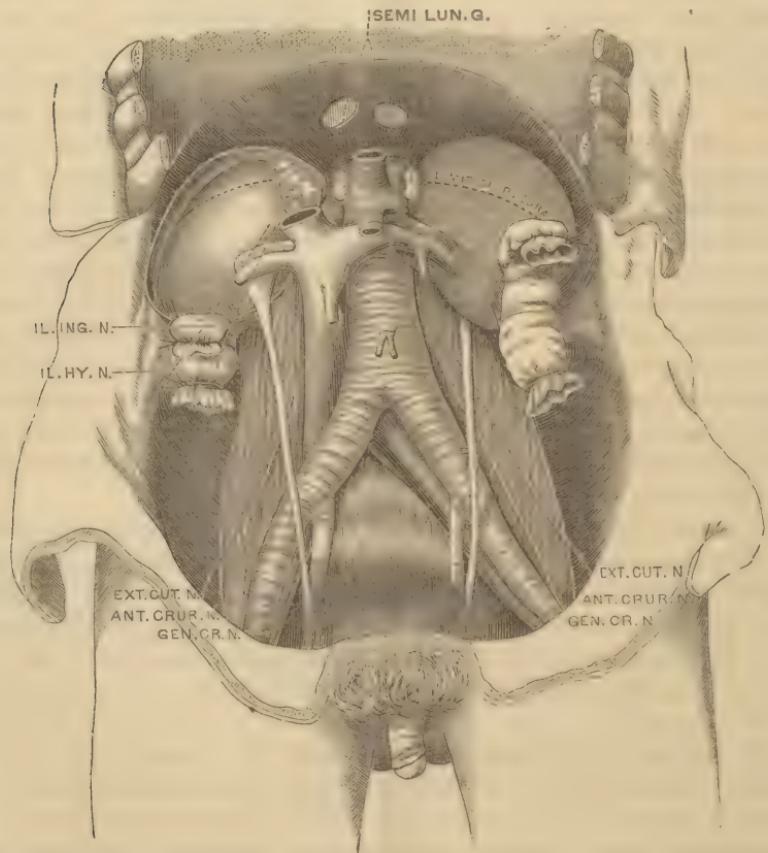
Localization.—The early recognition of the existence of perinephric abscess and the determination of its relative position with regard to the kidney is important. The promptness and efficiency of operative treatment must depend very much upon the early recognition of the exact position of the abscess. Cases have been reported in which incision or puncture failed to reach the suspected abscess-cavity, though the subsequent clinical history proved the correctness of the diagnosis. More exact comprehension of the bearing of locality upon symptoms, might, as is readily seen, have affected the position chosen for operation and thus have given earlier exit to the pus. The symptoms already described will enable the surgeon to make in the majority of cases the diagnosis quite early. I shall now therefore study the symptoms in connection with the surgical anatomy of the region, in the endeavour to bring out points which will make it possible to localize perinephric inflammation and abscess. As far as I know this line of investigation is new. Hence as no foundation for my conclusions has within my knowledge been laid by other writers, and as I have no corroborative evidence except in my own limited experience, the propositions and the deductions resulting from my dissections and studies should be accepted as suggestive and not final.

I arbitrarily divide the perinephric cellulo-fatty tissue into six tracts. The upper, middle, and lower anterior; and the upper, middle, and lower posterior tracts. There is of course no sharp definition between these regions, which are used to conveniently indicate the location of the disease. In discussing the subject I shall speak of inflammation and of abscess interchangeably though the symptoms of pressure are more marked in the latter event.

It may be premised as an axiomatic truth that, although there may be pains radiating in various directions, anterior inflammations will give rise to pain especially in the front or side of the abdomen, posterior lesions to pain in the loin. Tenderness upon pressure, œdema over the abscess and pointing will be similarly exhibited. The swelling, the tumour-like outlines and the feeling of resistance to palpation will naturally be the more evident in anterior lesions because the tissues between the disease and the surface are flaccid. Involvement of the chain of sympathetic ganglia, situated along each side of the spinal column, would occur in posterior lesions only. We, however, are ignorant of what symptoms would result from such inflammatory irritation or pressure.

In the two upper regions perinephric abscess is very liable to give rise to localized pleuritis of the bottom of the pleural sac. This is especially the case when the inflammation exists in the upper part of the *posterior* tract. The superior portion of the kidney lies upon the diaphragm, the lower margin of which crosses the back of the kidney in a direction obliquely

downwards and outwards. This is indicated in the wood-cut drawn from one of my dissections. This relation of the diaphragm is also shown by the depression of the kidney which occurs on deep inspiration. Holden says it descends nearly half an inch. The pleura on the upper surface of the



Dissection of the retro-peritoneal space showing the relations of the perinephric tissue and kidney to the diaphragm, colon, nerves and vessels. The ilio-hypogastric and ilio-inguinal nerves, and the lowest limit of the pleura, though posterior to the kidney, are indicated by lines, in order to show the relation.

diaphragm is therefore in proximity to the upper posterior perinephric region and readily becomes, from contiguity of structure, involved in the inflammation.¹ Careful auscultation will often reveal slight friction sounds and evidences of local pleuritis in the vicinity of the 11th or 12th rib when no *symptoms* of this complication are present. Serous effusion, empyema, or purulent expectoration from rupture of the abscess into the

¹ Plate VIII. of Dwight's Frozen Sections of a Child, shows this relation beautifully.

bronchial tubes may occur later. Abscess in the upper part of the kidney region may cause dyspnoea from the swelling of the infiltrated tissues preventing perfect descent of the diaphragm. This symptom may be induced whenever there is much swelling accompanying perinephritis, but it would evidently occur sooner and with less enlargement in inflammation of the upper areas.

The position of the supra-renal gland makes it liable to involvement when the upper anterior tract is the seat of disease, but we have not sufficient knowledge of the function of this organ to connect any definite symptoms with such supra-renal pressure or inflammation. The vicinity of the solar plexus and semilunar sympathetic ganglia to the upper anterior tract suggests that such digestive symptoms, as have been mentioned (p. 393) in connection with perinephritis, would especially occur when the upper anterior region was the seat of the abscess. Unfortunately the symptomatology of the sympathetic nervous system is at present too little understood to aid us much in our present researches. On the right side abscess of the upper anterior tract could, if there was considerable swelling, interfere with the return circulation in the vena cava, and thus induce dropsy of both lower extremities. Large swelling about any portion of the front of the right kidney might effect this, but the upper extremity of the kidney approaches rather nearer the vein than the lower, and therefore œdema of the legs would occur with less advance of the disease in this location. The right semilunar ganglion would not be likely to suffer from pressure until after the vena cava had been involved because it lies beneath and to the inner side of the vein.

I do not think that pressure upon the common bile-duct would readily occur in perinephritis of the right side, unless the swelling of the renal envelope was very great. If such interference to excretion of bile occurred, jaundice would be a marked symptom, and would locate the disease in the upper tracts of the right kidney. Similarly situated disease of great bulk might interfere with pancreatic excretion, causing fatty stools, or by making pressure on the vena portæ cause ascites. It does not seem to me probable that perinephric abscess would often interfere much with these structures because they lie near the middle line, and much more anterior than the kidney. This organ is placed in the hollow formed by the ribs and vertebrae, while the semilunar ganglia, the bile and pancreatic ducts, and the vena portæ lie in front of the vertebral bodies.

The symptoms liable to occur when the middle tracts are invaded are albuminuria, with perhaps tube-casts, due to renal congestion from pressure on the renal vein; and suprapubic, serotal or vulvar pain or anaesthesia on account of compression on the ilio-hypogastric and ilio-inguinal nerves. These symptoms are, I believe, less frequent when the abscess is in the anterior middle tract than in the posterior middle tract, because there is opportunity for the tumefaction to extend forward and relieve

the venous and nervous compression. Moreover, the nerves are too far behind to receive much pressure from anterior abscess. Hence if albuminuria and scrotal pain were present I should diagnosticate disease in the posterior middle tract; while if albuminuria existed without scrotal pain, neuralgia or anaesthesia, I should suspect anterior middle inflammation. Previous albuminuria must necessarily be excluded, to render the symptom of value in perinephric localization.

A higher degree of compression, particularly from posterior middle disease, would be liable to compress the pelvis and ureter, but symptoms of suppression of urine or uræmia would not be exhibited if the other kidney worked effectively. Actual inflammatory involvement of the pelvis or ureter would reasonably lead to the exhibition in the urine of pus in very moderate quantity.

Abscess in the anterior middle tract might cause scrotal œdema or even varicocele from obstruction to venous return in the spermatic vein. This would be more likely on the left side where the spermatic vein comes nearer the kidney by reason of emptying into the renal vein.

Perinephric inflammation about the lower portion of the kidney gives rise to an effect which is much more noticeable than any other consecutive symptom of perinephritis. This is flexion of the thigh due to spasm of the psoas and other flexors of the hip-joint on account of involvement of the anterior crural nerve. At the same time there may be anaesthesia or neuralgia of varying areas of the inner, anterior, or outer surfaces of the thigh from involvement of the sensory fibres of the genito-crural, external cutaneous, and anterior crural nerves. Retraction of the testicle will probably be present if the genito-crural nerve is implicated, because it supplies the cremaster muscle. This lifting of the testis indicates therefore a higher location of the abscess than when the hip-flexion exists without this accompaniment. A mere momentary retraction of the testicle which may arise from reflex irritation of various kinds is of no significance. Prolonged retraction would be the valuable symptom.

I believe the hip-flexion to be due to nerve compression rather than to a myositis of the psoas, because complete voluntary and passive extension is regained after recovery from the abscess, and also, in my opinion, after the pressure is relieved even before complete recovery. If inflammation of muscle existed I should expect a more or less permanent contracture. Pain at the knee may occur from pressure on the obturator nerve and possibly from similar involvement of the anterior crural which is also distributed to the knee. As these nerves both arise from the 3d and 4th and the branch from the 2d and 3d lumbar nerves, it does not matter by which one the pain is transmitted.

These symptoms I should expect to be developed earlier and more frequently in inflammatory exudations in the posterior than in the anterior lower tract. The reasons are that there is less room for expansive swell-

ing, and that all the nerves lie deeply under the psoas. The genito-crural and external cutaneous nerves come to the anterior and lateral surfaces of the psoas at distances from the kidney, varying in different subjects. The external cutaneous lying laterally is better protected than the genito-crural. Hence abscess in the anterior lower tract by extending downwards might involve these nerves in some cases when not extensive enough to do so in others. Posterior abscess as stated above, is of course much more liable to do so, and it can compress the nerves at a higher point, where they are still buried in the muscular mass of the psoas which lies beneath and to the inner side of the kidney.

Exudative inflammation at the lower part of the perinephric region may press upon the ilio-hypogastric and ilio-inguinal nerves, as in the middle tract, but at a lower point in the course of the nerves. In this event, however, the scrotal neuralgia and other symptoms due to such compression would not be accompanied by albuminuria from obstruction of the renal vein. In this instance, again, posterior disease, or at least disease at the lower extremity rather than in front of the kidney, would be most likely to give these resultant symptoms.

The duodenum lies behind the peritoneum, and crosses the spinal column at about the level of the lower anterior tract. Hence lesions in this tract on the right side might, by compressing this portion of intestine, cause obstruction, persistent vomiting, and rapid emaciation from non-assimilation. Abscess of the anterior middle tract could, perhaps, cause similar pressure.

In all cases it must be recollect that the right kidney usually lies about three-quarters of an inch lower than the left.

By burrowing of pus downwards symptoms of perityphlitis may be developed secondarily, and cause unilateral oedema from pressure on the external iliac vein. Abscess and sinus in the region of Poupart's ligament may be symptoms of perinephritis of the lower tracts. Anterior lower abscess of the left side is liable to produce constipation from pressure upon the descending colon, which, as shown in the cut from one of my dissections, is attached by the mesocolon over the lower half of the kidney. This is not so on the right side, where the ascending colon becomes free from the posterior wall just as it touches the inferior extremity of the kidney region, or perhaps extends upon and is fastened to only the very lowest part of its anterior surface.

It is barely possible that a large abscess of the right anterior lower tract might extend forward to the front of the spine, and compress the chyle reservoir, which lies in front of the second lumbar vertebra and to the right side and partly behind the aorta. The aorta would render such complication from the left perinephritis more difficult of consummation. Rapid emaciation would be expected as a result of such an unusual and quite unlikely complication.

I shall, in concluding this section of my subject, group in tabular form the more important deductions from my anatomico-clinical study.

A Table of the Symptoms of Probable and Possible Value in Localizing Perinephritis and Perinephric Abscess.

All anterior regions.—Pain, tenderness, swelling, œdema, and pointing in front and side of abdomen.

All posterior regions—Pain, tenderness, swelling, œdema, and pointing in loin.

Upper tracts.—Pleuritic friction, pleural effusion, empyema, expectoration of pus; dyspnœa; suprarenal involvement; solar plexus involvement. (On right side.) Bilateral œdema of legs; jaundice; fatty stools; persistent vomiting; rapid emaciation; ascites.

Middle tracts.—Albuminuria and casts; suprapubic, scrotal, or vulvar pain or anaesthesia; suppression of urine; uræmia; pus in the urine; œdema of scrotum or varicocele (especially on left side).

Lower tracts.—Flexion of hip; pain or anaesthesia of front, inside, or outside of thigh; retraction of testicle; pain at knee; scrotal or vulvar pain or anaesthesia, without accompanying albuminuria; unilateral œdema of legs; abscess or sinus near Poupart's ligament; constipation (if left side); involvement of chyle receptacle (if right side).

In deciding upon the point of operation, after a diagnosis of the locality of the abscess has been made, the surgeon must bear in mind the relation of the kidney to the bony landmarks. The upper border of the organ corresponds very nearly with the space between the eleventh and twelfth dorsal spines. The lower extremity of the kidney is about on the level of the third lumbar spine. The vessels and pelvis of the kidney correspond with the level of the first lumbar spine. The right kidney lies a little lower than the left. The eleventh rib marks with considerable accuracy the upper edge of the kidneys. The right kidney has its top nearly on a level with the lower border of that rib, while the left has its upper end about on a level with the upper margin of the same rib. The kidney is about two inches wide, and lies with its inner border quite close to the vertebral bodies.

Prognosis.—A few cases of perinephritis recover without going on to suppuration. The percentage of such results is not obtainable. Gibney gives a good many such instances, of which one was of six months' duration. When suppuration occurs the prognosis is good if early evacuation is accomplished spontaneously or by the surgeon's incision. When the pus is allowed to burrow, prolonged suffering, hectic fever, and often death are the consequence. A fatal issue is certain under such circumstances.

unless the pus is finally discharged through some opening. Incision, of course, greatly hastens recovery.

Treatment.—During the early stages, counter-irritation to the loin by iodine and blisters may be employed. The frequent application of the hot-water douche has apparently been beneficial. Morphia, and similar remedies, and laxatives will usually be required.

When resolution does not take place, and there are evidences of a deeply seated posterior abscess forming, the proper treatment is early incision in the loin over the kidney. When the skin and deep fascia have been incised, the muscles, which may or may not be softened, can usually be torn through with the finger. By boring with the finger to the depth of two or three inches the surgeon will probably strike the pus cavity. If not, the free opening thus made will allow an early evacuation of the pus which will soon find its way to the wound. The finger is a better instrument than the knife, because the tearing apart causes little bleeding, and the finger can appreciate the direction of the pus by the friability of the muscles. If preferred by the operator, a grooved director may be pushed into the tissues, and a pair of dressing forceps slipped along this into the softened structures. By separating the blades, and withdrawing the forceps with the blades apart the surgeon can tear open the abscess without much risk of hemorrhage.

Anterior abscesses may be aspirated or incised from the lateral or anterior aspect of the abdomen. When small, their treatment will be greatly complicated by the relation of the peritoneum and intestines. Poland has tabulated,¹ chiefly, but not entirely, from Troussseau and Bowditch, 28 cases of perinephric abscess which he considers primitive; that is, not due to pyelitis, calculous nephritis, or like causes. Of these, in 8 cases no operation was done; in 5, more or less satisfactory attempts at operative evacuation were made by puncture with the trocar and canula, or by applying caustic potassa; and in 15, free incision was adopted. Death took place in 6 of the 8 cases left to nature's efforts, in 1 of the second group, and in 1 of the 15 cases treated by incision.

Bowditch, in 1870, especially insisted upon early incision. The reasons for such surgical action are at the present day so patent and so universally accepted that it is unnecessary to dwell upon the point.

After incision, free drainage, antiseptic affusions and poultices are proper.

¹ British and Foreign Medico-Chirurgical Review, 1871, vol. ii. p. 235.

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